Air Conditioning
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Install Or Verify The Accuracy Of An Air Conditioner's Installation		
The candidate must describe and record these characteristics of an air conditioner.		
Did the candidate		
Record the air conditioner model number?		
Record the air conditioner serial number?		
Record the type of air conditioner (ducted or non-ducted)?		
Indicate OEM or Aftermarket installation?		
Verify compatibility of the component parts (i.e., Rooftop unit, Ceiling plenum, Wall control)?		
The candidate must confirm the proper installation of an air conditioner (including the ceiling plenum)		
Did the candidate		
Verify the air conditioner is bolted down properly (Gasket compression approximately 50%)?		
Verify proper ceiling plenum installation including return and supply air separation?		
Verify installation wiring conforms to all applicable codes, proper wire gauge, breaker size, etc.?		
Verify adequacy of ducting, vents, and size of registers per installation instructions/service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the installation instructions?		
Evaluate Air Conditioner Performance		
Measure line voltage to the air conditioner		
Did the candidate		
Use a VOM to check incoming static voltage at the air conditioner voltage connection points?		
Start the air conditioner on high cool and check this voltage reading again after applying the load?		
Interpret the accuracy and validity of these voltage readings (should be between 103.5 & 126.5 VAC)?		
Correctly diagnose and repair problems, if any exist, in accordance with the service manual if voltage readings are not within the pre-described limits?		
Measure the temperature difference across the evaporator (supply & return air temperatures)		
Did the candidate		
Start the air conditioner in the high cool position?		
Allow the air conditioner to run for a minimum of 30 minutes?		
Open all discharge and supply air registers completely?		
Place a thermometer near the return air grille/louvers and measure the air temperature?		
Place a thermometer in the supply register/louver and measure the air temperature?		
Verify accuracy and validity of this calculation to the manufacturer specifications; 20 degrees difference nominal (See service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
Measure the compressor amperage		
Did the candidate		
Start the air conditioner in the high cool position?		
Allow the air conditioner to run for a minimum of 30 minutes?		
Measure the outdoor ambient temperature?		
Record the compressor rated load amperage (RLA) printed on the air conditioners rating plate?		
Use the information found in the service manual to calculate correct amperage based on RLA and outdoor temperature?		
Read the compressor amperage with an Ammeter?		
Confirm the measure compressor amperage and calculated amperages are approx. equal?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Subtract the supply air temperature from the return air temperature?		

Troubleshooting Air Conditioner
Key Electrical Components
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Note: Due to product differences the candidate must consult the service manual for individual component specifications,		
procedures, and sequence of operation		
Air Conditioner Compressor		
Did the candidate		
Correctly measure compressor amperage?		
Correctly measure resistance of the compressor motor windings?		
Remove all electrical power from the air conditioner; remove all wires from the compressor; check terminals C&R, C&S, R&S?		
Measure running voltage at the proper location on the compressor?		
Accurately diagnose compressor problems, if any exist, in accordance with the service manual?		
Air Conditioner Fan Motor		
Did the candidate		
Correctly measure fan motor amperage?		
Correctly measure resistance of the fan motor windings?		
Remove all electrical power from the air conditioner; remove all wires from the fan motor; check motor windings for short, open or ground (see service manual)?		
Measure running voltage at the proper location on the fan motor?		
Accurately diagnose and repair fan motor problems, if any exist, in accordance with the service manual?		
Air Conditioner Capacitor(s)		
Did the candidate		
Properly discharge the capacitor(s) per the service manual?		
Properly test the capacitor(s) per the service manual?		
Accurately diagnose and repair capacitor problems, if any exist, in accordance with the service manual?		
Select either manual thermostat or wall thermostat		
Manual Thermostat		
Did the candidate		
Remove all electrical power from the air conditioner; remove all wires from the thermostat; check the thermostat with an Ohmmeter?		
Accurately diagnose and repair the thermostat problems, if any exist, in accordance with the service manual?		
Manual Selector Switch		
Did the candidate		
Remove electrical power from the air conditioner; remove wires from the switch; check the selector switch with an Ohmmeter?		
Wall Thermostat		
Did the candidate		
Measure low voltage power into the wall thermostat?		
Measure low voltage power out of the wall thermostat?		
Accurately diagnose and repair thermostat problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
*Upper Control Box A*ssembly		
Did the candidate		
Measure low voltage power from the wall thermostat to the control box?		
Measure high voltage power (120VAC) out of the upper control box assembly to the rooftop air conditioner?		
Accurately diagnose and repair control box assembly problems, if any exist, in accordance with the service manual?		
Accurately diagnose and repair selector switch problems, if any exist, in accordance with the service manual?		

Furnace
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Install or Verify the Accuracy of a Furnace's Installation		
The candidate must describe and record these characteristics of a furnace.		
Did the candidate		
Record the furnace model number?		
Record the furnace serial number?		
Record the type of furnace system?		
Indicate OEM or Aftermarket installation?		
The candidate must confirm the proper installation of a furnace.		
Did the candidate		
Verify proper ducting?		
Verify proper return air?		
Verify proper gas pressure at furnace?		
Verify proper propane connections and conduct a leak test ?		
Document leak test results?		
Verify proper DC/AC voltage at furnace?		
Verify proper exhaust vent system?		
Verify proper seals at door, vents etc.?		
Accurately diagnose and repair installation problems, if any exist, in accordance with the installation manual?		
Evaluate Furnace Performance		
Measure line voltage at the furnace		
Did the candidate		
Check incoming voltage at the wire connections on side of furnace? Nominal voltage should be 10.5-13.5 VDC under unloaded condition.		
Turn furnace on?		
Verify ignition?		
Check voltage at the wire connections on side of furnace? Nominal voltage should be 10.5-13.5 VDC under loaded condition.		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure propane pressure at furnace		
Did the candidate		
Turn propane off at container?		
Install manometer at pressure test port?		
Turn propane on at container?		
Check for proper gas pressure (see service manual)?		
Document measurement results?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
Evaluate proper air flow		
Did the candidate		
Open all discharge registers and any closeable registers(see installation and or service manual for requirements)?		
Verify air discharge by feel or using an air speed indicator?		
Verify that the discharge is warm?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Evaluate return air flow		
Did the candidate		
Verify proper return air opening size (see installation and or installation manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Troubleshooting Key Furnace
Electrical Components
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Troubleshoot Key Furnace Electrical Components		
Did the candidate verify sequence of operation per the service manual to evaluate the following components?		
Thermostat		
Did the candidate		
Verify proper height and location per installation and or service manual?		
Verify voltage to thermostat and voltage out of thermostat to furnace (see service manual)?		
On/Off Switch		
Did the candidate		
Remove power wires and check switch for continuity using an ohmmeter?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Circuit Breaker (If applicable)		
Did the candidate		
Measure DC voltage in and out of circuit breaker?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Time Delay Relay (if applicable)		
Did the candidate		
Confirm DC voltage at proper terminals (refer to service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Blower Motor		
Did the candidate		
Confirm DC voltage to blower motor?		
Measure DC amperage at motor (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Limit Switch		
Did the candidate		
Verify continuity or DC voltage through limit switch?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Sail Switch		
Did the candidate		
Verify continuity or DC voltage through sail switch?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
***Either* Fan Control Circuit Board**		
Verify proper DC voltage to circuit board (see manual)?		
Verify function of circuit board (see manual functions)?		
Spark		
DC voltage to gas valve		
Sense flame		
Energize relay to start fan		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
***Or* Ignition Board**		
Did the candidate		
Verify proper DC voltage to ignition board (see manual)?		
Verify function of ignition board (see manual functions)?		
Spark		
DC voltage to gas valve		
Sense flame		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Gas Valve		
Did the candidate		
Measure proper voltage at valve?		
Remove power wires and check coils for proper resistance 30-50 ohms?		
Check for proper gas flow exiting valve orphic (if ignition fails check by smell or use manometer)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Electrode		
Did the candidate		
Check for proper gap (see manual)?		
Check for proper spark across electrode to ground?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Did the candidate		

Water Heater
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Install or Verify The Accuracy of a Water Heater's Installation		
The candidate must describe and record these characteristics of a water heater.		
Did the candidate		
Record the water heater model number?		
Record the water heater serial number?		
Verify type of control system?		
The candidate must confirm the proper installation of a unit		
Did the candidate		
Check the seal around the flange?		
Confirm the vent is clear and properly gapped from door screen (0 to 1/4" - see installation manual)?		
Confirm the gas line is properly sealed from interior of coach?		
Verify wiring complies with NEC code (if applicable)?		
Conduct a leak test on the propane connection to the water heater?		
Verify the water heater is properly supported?		
Accurately diagnose and repair problems, if any exist, in accordance with the installation instructions?		
Evaluate Water Heater Performance		
Measure propane pressure at water heater		
Did the candidate		
Turn propane off at the container?		
Install manometer on the provided pressure test port?		
Turn propane on at the container?		
Check for proper propane pressure (see service manual)?		
Document results?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Verify customer complaint		
Did the candidate		
Visually inspect gas flame, burner tube, flu box, and wires?		
Troubleshoot Key Components		
Determine the proper pilot control type (pilot, DSI or electric)		
Pilot Control		
Gas valve/ECO		
Did the candidate remove the thermocouple and measure for continuity?		
Pilot assembly		
Did the candidate check the pilot for proper flame (see service manual)?		
Thermocouple		
Did the candidate measure millivolts in heated state (12 millivolts)?		
Burner		
Did the candidate check for blockage at the orifice?		

STEP	Initials	Date
DSI Control		
Switch		
Did the candidate		
Determine proper 12 VDC and ground to switch?		
Verify proper wiring (refer to service manual)?		
Thermostat		
Did the candidate test for voltage to thermostat or ECO?		
Circuit Board		
Did the candidate check for power to the circuit board from thermostat/ECO?		
Gas Valve		
Did the candidate		
Check for power coming from board/ECO?		
Disconnect power source and measure ohms on coils on valve (refer to service manual)?		
Electrode		
Did the candidate		
Check for proper gap (refer to service manual)?		
Check for spark at proper point on electrode?		
Visually inspect the electrode wire?		
Burner		
Did the candidate		
Inspect burner for proper flame and adjust as necessary (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Electric Control		
Switch		
Did the candidate test for proper voltage to switch?		
ECO		
Did the candidate test for power from switch?		
Thermostat		
Did the candidate test for power from ECO?		
Heating Element		
Did the candidate		
Test for power from thermostat?		
Did the candidate disconnect power to heating element and perform an ohms test (see service manual)		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Refrigerator
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Install or Verify the Accuracy of a Refrigerator's Installation		
The candidate must describe and record these characteristics of a refrigerator		
Did the candidate		
Record the refrigerator model number?		
Record the refrigerator serial number?		
Verify the refrigerator's type of control system?		
The candidate must confirm the proper installation of a refrigerator		
Did the candidate		
Confirm proper side, top, and rear clearances ?		
Confirm proper venting per service or installation manual (i.e., bottom, upper, side, or roof vent)?		
Confirm the refrigerator compartment is properly sealed from interior of coach (see service or installation manual)?		
Verify wiring complies to NEC code?		
Verify proper propane connection to refrigerator (leak test)?		
Accurately diagnose and repair installation problems, if any exist, in accordance with the installation instructions?		
Evaluate Refrigerator Performance		
Measure propane pressure at refrigerator		
Did the candidate		
Turn the propane off at the container?		
Install a manometer at the provided pressure test port?		
Turn propane back on at the container?		
Measure for proper propane pressure (see service manual)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure incoming 12 VDC at refrigerator		
Did the candidate		
Measure incoming VDC at refrigerator DC terminal block (10.5-14.5 VDC per manufacturer's specification)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Measure 120 VAC at refrigerator		
Did the candidate		
Measure incoming VAC (108-132 VAC per manufacturer's specification) at the receptacle?		
Measure AC voltage at control board or selector switch?		
Verify the adequacy of the voltage readings?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Perform run test (12-24 hrs)		

STEP	Initials	Date
Did the candidate		
Put a thermometer in 1 gallon of water and run the refrigerator for 12-24 hours (thermometer should read 40-43 ^{o} F (4 – 6 ^{o} C) or less)?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

Refrigerator
Troubleshooting Key Components
Sign-Off Sheet

Printed Technician Name		Social Security Number
Address		Telephone Number
City	State	Zip Code

STEP	Initials	Date
Troubleshoot Electrical Components		
Manual Control Refrigerator		
Selector Switch		
Did the candidate		
Turn off all AC power to the refrigerator?		
Disconnect wiring to the selector switch?		
Perform a continuity test on the selector switch per service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Thermostat		
Did the candidate		
Turn off all AC power to the refrigerator?		
Disconnect wiring to the thermostat?		
Perform a continuity test on the thermostat in accordance with the service manual?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Heating Element (120 VAC/12 VDC)		
Did the candidate		
Turn off all AC and DC power to the refrigerator?		
Disconnect heating element wires?		
Conduct a resistance test to check for proper resistance per service manual or calculate proper resistance per ohm's law?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		
Electronic Control Refrigerator		
verify model and type of electronic control system		
Note: Due to the complexity of control systems see the individual service manual to diagnose the following components		
Upper Control Board		
Did the candidate check the upper control board (power in and power out)?		
Lower Control Board		
Did the candidate check the lower control board (power in and power to appropriate components)?		
Heating Element (120 VAC/12 VDC)		
Did the candidate		
Turn off all AC and DC power to the refrigerator?		
Disconnect all heating element wires?		
Conduct a resistance test to check for proper resistance per service manual or calculate proper resistance per ohm's law?		
Accurately diagnose and repair problems, if any exist, in accordance with the service manual?		

STEP	Initials	Date
Propane Components		
Either Manual Control Refrigerator		
Safety Valve		
Did the candidate check the safety valve by testing it using a known good thermocouple?		
Piezo Igniter		
Did the candidate depress the Piezo igniter and check for resistance and spark?		
Thermocouple		
Did the candidate check the thermocouple using a known good safety valve or by measuring for millivolts (13-20 millivolts) in accordance with the service manual?		
Electrode		
Did the candidate visually inspect for cracks in wiring or the ceramic insulator?		
Or Electronic Control Refrigerator		
Gas Valve		
Did the candidate		
Disconnect wires to the gas valve and measure ohm's resistance (see service manual)?		
Verify propane pressure through the gas valve with a manometer installed at the test port and with the gas valve energized?		
Reigniter		
Did the candidate		
Measure 12 VDC at the reigniter (Minimum 9.5 VDC - see service manual)?		
Check ground to the reigniter?		
Electrode		
Did the candidate		
Check for cracks in wiring and ceramic covering?		
Verify the electrode has the proper spark gap (see service manual)?		
Thermocouple		
Did the candidate measure millivolts with refrigerator operating on propane (see service manual for specific readings)?		
Orifice		
Did the candidate verify proper orifice size (see service manual)?		
Did the candidate accurately diagnose and repair problems, if any exist, in accordance with the service manual?		